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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,606	02/23/2004	Frank Dimeo JR.	Atmi-546-CIP-I	8335
25559	7590	06/16/2005	EXAMINER	
ATMI, INC. 7 COMMERCE DRIVE DANBURY, CT 06810			SAINT SURIN, JACQUES M	
			ART UNIT	PAPER NUMBER
			2856	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/784,606	<b>Applicant(s)</b> DIMEO ET AL.	
	<b>Examiner</b> Jacques M. Saint-Surin	<b>Art Unit</b> 2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2005.  
 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☒ Claim(s) 26-36 is/are allowed.  
 6) ☒ Claim(s) 1-25 and 37-39 is/are rejected.  
 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 23 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All b) ☐ Some \* c) ☐ None of:  
 1. ☐ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
 \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date 09/07/04.  
 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) ☐ Notice of Informal Patent Application (PTO-152)  
 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. The election/restriction applied over claims 1-39 in the last office action has been withdrawn in view of newly amended claims 26 and 36.

#### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 11 is rejected under 35 U.S.C. 112, first paragraph, because the claim is subjected to an undue breadth by reciting only a single means and thus encompasses all possible means for performing a desired function (ex parte Bullock, 127 OG 1580). In re Hyatt, 218 USPQ 195.

#### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 5-10, 12-14, 16-18 and 20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Dimeo, Jr. et al. (US Patent 6,265,222) hereinafter Dimeo or Gruber (US Patent 3,676,293) or Bernstein (US Patent 5,752,410).

Regarding claim 1, Dimeo discloses a gas sensor assembly (hydrogen sensor apparatus 50, see: Fig. 4) comprising at least one metal sensor element (the thin film sensor element includes a film of hydrogen-interactive metal film (see: abstract) formed

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on a free-standing support structure (lowermost layer 12 defines a suspended membrane or microbridge, see: col. 14, lines 30-32; layers 12, 14, 16, 18, 20, 22 and 24 corporately constitute the micro-hotplate structure of the hydrogen sensor, col. 14, lines 39-41), wherein said metal sensor element comprises metal or metal alloy exhibiting a detectable change upon contact with a halogen species (a detector for sensing a detectable change of physical property of the film in exposure to hydrogen and generating a correlative output indicative of hydrogen presence, see: col. 3, lines 1-4), and wherein said free-standing support structure comprises a support material that is resistant to said halogen species (the suspended structure is overlaid with the thin film sensor layer 26, including a rare earth metal thin film optionally overlaid with a hydrogen-permeable protective barrier layer thin film to prevent oxygen and other oxidizing species from contacting the rare earth metal thin film, see: col. 14, lines 42-45. Note that the term "hydrogen-interactive thin film element" means one or more thin films wherein at least one thin film is selected from the group consisting of one or more rare earth metals, one or more Group II elements as well as alloys or combinations thereof. As used herein the term "rare earth metal means a metal selected from scandium, yttrium, lanthanum, the lanthanides, and the actinides as well as alloys and combinations of such metals, and alloys and combinations of such metals with Group II elements, see: col.

Regarding claim 2, Dimeo discloses for example, in the presence of hydrogen, noble metal (e.g., Pd, Pt) overcoated Y reacts to form the dihydride (YH<sub>2</sub>), see: col. 7, lines 60-61.

Regarding claim 3, Dimeo discloses the testing was done at atmospheric pressure in a nitrogen environment, see; col. 16, lines 15-16.

Regarding claims 4-5, Dimeo discloses the lowermost layer is formed of silicon dioxide and defines a suspended membrane or microbridge, see: col. 14, lines 30-32.

Regarding claim 6, Dimeo discloses the central processor unit 44 processes the signal carried by signal transmission line 48, and produces an output signal that is transmitted in signal transmission line 46 to output device 40, which produces an output that is indicative of the presence or absence of hydrogen in the environment to which the sensor is exposed, see: col. 15, lines 56-62.

Regarding claim 7, Dimeo discloses such micro-hotplate structure heating of the hydrogen sensor film significantly enhances the operation of the sensor device of the invention, relative to a corresponding sensor device lacking the micro-hotplate structure. For example, in a sensor device lacking the micro-hotplate structure, for ambient temperature sensing of hydrogen gas, typical response times were on the order of 1 minute after exposure to H.sub.2, but complete recovery after removal of the H.sub.2 source from the sensor was on the order of hours. By contrast, heating of the sensor film by the micro-hotplate structure substantially improves both the response and recovery times of the sensor device. The micro-hotplate allows electrical measurement of the sensor film while controlling the temperature of the film, thus allowing the formation of the hydride in a highly effective manner, see: col. 5, lines 35-49.

Regarding claims 8-10, Dimeo discloses the micro-machined sensor platforms define a 4-element gas-sensing array in which the active elements are shown as light gray regions, see: col. 14, lines 24-26.

Regarding claims 12-14 and 16, as discussed above, it is similar in scope with claim 1 and therefore is rejected for the reasons set forth for that claim. Furthermore, Dimeo discloses the lowermost layer 12 is formed of silicon dioxide ( $\text{SiO}_2$ ) and defines a suspended membrane or microbridge, see: col. 14, lines 30-32.

Regarding claims 17-18 and 20-21, Dimeo discloses the protective layer may include a metal such as Pd, Pt, It, Rh, Ag, Au, Ao and alloys thereof (col. 2, lines 53-55).

6. Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Gruber (US Patent 3,676,293).

Regarding claim 11, Gruber discloses a present 15 fibrous form of silicon carbide with a reinforcing agent iii intimately bonded admixture therewith, the said reinforcing agent being selected from the group consisting of carbon, metals and oxides. Suitable metals for this purpose include refractory metals such as nickel, cobalt, olybdenum and the like, see: col. 10, lines 30-37.

7. Claims 37-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Bernstein (US Patent 5,752,410).

Regarding claims 37-39, Bernstein discloses Referring to FIG. 3, the tunneling sensor 10 is shown in its initial fabrication stage comprising the silicon wafer substrate 14 that is coated on both its front and back sides with front 70 and back 72 dielectric

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layers, which may be silicon dioxide, silicon nitride, or silicon carbide. The preferred material for the dielectric layers 70 and 72 is thermally grown silicon dioxide.

Referring to FIG. 4, the tunneling sensor 10 is shown after the front 70 and back 72 dielectric layers (hereinafter referred to as the initial oxidation, or initial oxide, layers) have been patterned using conventional photolithography and either wet or dry etching. (18) Referring to FIG. 5, the tunneling sensor 10 is shown after a boron diffusion has been performed on selected regions 12, 76, and 78 of the silicon wafer 14 through the patterned openings in the initial oxide layers 70 and 72.

The initial oxide layers 70 and 72 are used as a diffusion mask to selectively diffuse boron through the patterned openings. Referring to FIG. 7, the tunneling sensor 10 is shown after a sacrificial (spacer) layer 74 has been deposited on selected patterned regions. This spacer layer 74 may be photoresist, polyimide, silicon dioxide, polysilicon, or other sacrificial layers known to those skilled in the art. The preferred spacer layer material is positive photoresist. The boron diffusion is preferably carried out using a solid source boron diffusion at a temperature between 1100.degree. C. and 1200.degree. C., although gas sources can also be used.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimeo (US Patent 6,265,222) in view of Gruber (US Patent 3,676,293).

Regarding claims 15 and 19, Dimeo does not disclose a silicon carbide. Gruber discloses a present 15 fibrous form of silicon carbide with a reinforcing agent iii intimately bonded admixture therewith, the said reinforcing agent being selected from the group consisting of carbon, metals and oxides. Suitable metals for this purpose include refractory metals such as nickel, cobalt, olybdenum and the like, see: col. 10, lines 30-37. It would have been obvious to one of the ordinary skill in the art at the time of the invention to utilize in Dimeo the silicon carbide of Gruber as taught above because it would provide a heat-reflective coating particularly for high temperatures thereby making the above combination more effective.

11. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dimeo (US Patent 6,265,222) in view of Huang et al. (US Patent 6,553,335).



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Regarding claims 22 and 24, Dimeo does not disclose a fluid locus. Huang discloses flowing a cleaning fluid into the chamber cavity and in-situ cleaning the interior surface of the chamber cavity, see: col. 6, lines 7-9. It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Dimeo the fluid of Huang as taught above because the chamber cleanliness condition can be easily achieved in a reliable manner.

Regarding claim 23, Huang discloses the sensor is exposed to gases or liquid, see: abstract.

Regarding claim 25, Dimeo does not disclose a fluoro species selected from the group consisting of  $\text{NF}_3$ ,  $\text{SiF}_4$ ,  $\text{C}_2\text{F}_6$ ,  $\text{HF}$ ,  $\text{F}_2$ ,  $\text{COF}_2$ ,  $\text{ClF}_3$ ,  $\text{IF}_3$  and activated species thereof. Huang discloses the at beginning of a cleaning process, the plasma gas generated in the resonant cavity includes  $\text{NF}_3$  and  $\text{SiF}_4$ , see: col. 3, lines 28-31. It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Dimeo the fluoro species of Huang because while  $\text{NF}_3$  cleaning gas continuously flows into the process chamber interior, the  $\text{NF}_3$  is also consumed simultaneously, resulting in a constant radiation brightness being detected thereby making the above combination more efficient.

### ***Allowable Subject Matter***

12. Claims 26-36 are allowable over the prior art of record.

### ***Conclusion***


13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacques M. Saint-Surin whose telephone number is

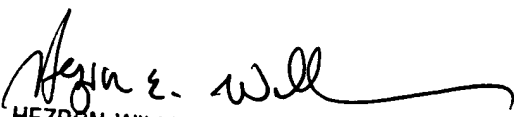
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(571) 272-2206. The examiner can normally be reached on Mondays through Fridays  
10:30 A.M. -7:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272 2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jacques M. Saint-Surin  
June 12, 2005

  
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